

Program Description I

Program Title CONCENTRATION

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Program Description, Equations, Variables

Concentration challenges the ability of a player to correctly recall numbers. Each number is displayed for approximately $2\frac{1}{2}$ seconds. Perfect recall will be rewarded with a larger number while an incorrect guess results in a smaller number. After three incorrect guesses, the player's score will be displayed as a negative number. This score will be the total number of digits correctly guessed from all of the numbers displayed.

The average number of digits correctly guessed for the three numbers missed can also be obtained. This average is typically less than a player's actual recall ability because incorrect guesses are usually wrong in several places.

Skilled players may increase the level of difficulty at the start of each game by entering the number of digits desired.

Operating Limits and Warnings

At least one digit must be entered for every guess, i.e., zero is not an acceptable guess. Random number seeds must be positive quantities less than one. Difficulty factors must be positive integers from 2 to 10.

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Program Description II

Sketch(es)

Sample Problem(s) Enter 0.123456789 and press A:

<u>TRIAL</u>	<u>NUMBER</u>	<u>GUESS</u>	<u>COMMENTS</u>
1.	3	3	
2.	46	46	
3.	593	593	
4.	7208	7208	
5.	84827	84827	
6.	975711	9757111	Extra digits won't count off.
7.	2031448	2031445	The last digit is wrong.
8.	330578	330578	
9.	4580116	45801	The first 5 digits are right!
10.	585444	558444	2nd and 3rd digits are interchanged.

The total number of digits correctly guessed is -42. The average number of correct digits in the three numbers missed is 5.00.

Solution(s)

SCORE

ABILITY

9 or less	Total amnesia
10 - 25	Counting requires use of fingers
26 - 45	Survival level
46 - 57	You are not concentrating
58 - 70	Average memory
71 - 83	Excellent recall
84 - 97	Recites zip codes from memory
98 or more	Eidetic memory

Reference(s)

The diagram shows a 16-bit shift register. It has four data inputs at the bottom labeled START, DIFF, AVG, and an unlabeled input. There are two control inputs on the left: input 1 with a left-pointing arrow and input 2 with a right-pointing arrow. The register is labeled CONCENTRATION at the top.

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	f LBL A	31 25 11	Initialize all registers. If F3 is set, change Random Number seed.		h LSTx	35 82	Compute sum of digits of all numbers guessed
	h F? 3	35 71 03			g x = y	32 51	
	h F? 3	35 71 03			GTO 1	22 01	
	RCL 1	34 01		060	h SF 2	35 51 02	
	f CL REG	31 43			1	01	
	f P ↔ S	31 42			STO + 4	33 61 04	
	STO 1	33 01			GTO 1	22 01	
	f LBL 0	31 25 00			f LBL 2	31 25 02	
	RCL 1	34 01			1	01	
010	h π	35 73	Generate new Random Number such that $0 \leq \text{RN} < 1$.		STO + 5	33 61 05	Increase difficulty up to ten digits.
	+	61			RCL 0	34 00	
	g FRAC	32 83			STO + 5	33 61 05	
	STO 1	33 01			h F? 2	35 71 02	
	9	09		070	GTO 3	22 03	
	x	71	Generate number (N) with required number of digits such that most significant digit is not zero.		9	09	
	1	01			g x > y	32 81	
	+	61			g ISZ (i)	32 34	
	RCL 0	34 00			GTO 0	22 00	
	g 10 ^x	32 53			f LBL 3	31 25 03	
020	x	71			STO + 6	33 61 06	Accumulate number of digits in all numbers guessed incorrectly. Stop after three incorrect guesses. Otherwise, decrease difficulty down to one digit.
	f INT	31 83			2	02	
	STO 2	33 02			RCL 7	34 07	
	h PAUSE	35 72	Display number (N) for 2½ seconds.		g x = y	32 51	
	h PAUSE	35 72		080	GTO 4	22 04	
	CLx	44			RCL 0	34 00	
	R/S	84			1	01	
	ENTER	41	Input guess.		STO + 7	33 61 07	
	f LOG	31 53			g x ≤ y	32 71	
	f INT	31 83			STO - 0	33 51 00	
030	RCL 0	34 00	Left justify digits in guess so that it is the same size as N.		GTO 0	22 00	Compute score.
	-	51			f LBL 4	31 25 04	
	g 10 ^x	32 53			RCL 4	34 04	
	÷	81			RCL 5	34 05	
	f INT	31 83		090	-	51	
	STO 3	33 03			h CF 3	35 61 03	
	f LBL 1	31 25 01			h RTN	35 22	
	RCL 3	34 03			f LBL B	31 25 12	
	RCL 2	34 02			f P ↔ S	31 42	
	g x = y	32 51	Determine number of digits correctly guessed by testing least significant digit (LSD) first. If it is incorrect, set Flag 2 and increment error count by 1. If all other digits are now correct, end loop. Otherwise, remove LSD and repeat.		STO 0	33 00	
040	GTO 2	22 02			g DSZ (i)	32 33	Input desired difficulty factor (number of digits).
	1	01			h CF 3	35 61 03	
	0	00			f P ↔ S	31 42	
	STO ÷ 2	33 81 02			h RTN	35 22	
	STO ÷ 3	33 81 03		100	f LBL C	31 25 13	
	RCL 2	34 02			RCL 6	34 06	
	ENTER	41			RCL 4	34 04	
	g FRAC	32 83			-	51	
	-	51			3	03	
	STO 2	33 02			+	61	
050	h LSTx	35 82			h LSTx	35 82	Compute average number of digits correctly guessed for all numbers guessed incorrectly
	RCL 3	34 03			÷	81	
	ENTER	41			DSP 2	23 02	
	g FRAC	32 83			h PAUSE	35 72	
	-	51		110	DSP 0	23 00	
	STO 3	33 03			h RTN	35 22	
	CLx	44					

REGISTERS

0	1	2	3	4	5	6	7	8	9
DIFF	RND NUM	N	GUESS	ERR	SOD	USED	USED		
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B	C	D	E	I				

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